Amendments to the Specification

Please replace the paragraph beginning on page 1, line 20, with the following rewritten paragraph:

In FIG. 9, the encoder 100 comprises a hybrid filter bank (hereinafter referred to as an "HFB") 110, a psychoacoustic analysis portion 120, ~~a iteration~~ an iteration loop 130, a Huffman coding portion 140, a side information coding portion 150, and a stream composing portion 160.

Please replace the paragraph beginning on page 2, line 15, with the following rewritten paragraph:

The iteration loop 130 makes the non-linear quantization of the input frequency spectrum in accordance with weighting of the data based on the analysis result of the psychoacoustic analysis portion 120. Also, the iteration loop 130 calculates a scale factor (the information regarding the weighting of the data based on the analysis result of the psychoacoustic analysis portion 120) from an output signal (frequency spectrum) of the ~~HFG 110,~~ HFB 110, and outputs it to the side information coding portion 150.

Please replace the paragraph beginning on page 3, line 14, with the following rewritten paragraph:

The stream decomposing portion 210 decomposes the stream data received from the communication channel ~~into the~~ into frames.

Please replace the paragraph beginning on page 8, line 9, with the following rewritten paragraph:

At first, the input data stream X is processed through the inverse MDCT for each data block in accordance with the expression (3), and transformed into the data blocks D2-0 to D2-31 composed of 36 pieces of data. In FIG. 12, the arrow indicated within the data block

D2-n ~~indicate~~ indicates the data arranging order. The same notation is appropriately employed below.

Please replace the paragraphs beginning on page 10, line 17 through page 18, line 21, with the following rewritten paragraphs:

In order to accomplish the above object, according to the present ~~invention as set forth in claim 1,~~ disclosure, there is provided a filtering method for use in decoding a digital signal from the frequency domain to the time domain, including: a first step of multiplying an input data stream and a transformation matrix that is decomposed into a sparse matrix from an inverse MDCT transformation matrix (e.g., a transformation matrix $P_{N\times N/2}$ in the expression (4)) for making the inverse MDCT transformation of the input data stream composed of a plurality of data blocks, and has a smaller size than the inverse MDCT transformation matrix, to acquire an output data stream composed of a plurality of data blocks; a second step of storing predetermined data (e.g., a "former stage block data" as described in Detailed Description of the Invention) contained in each data block of the output data stream; and a third step of generating the digital signal in the time domain on the basis of each data block acquired at the first step and the predetermined data stored at the second step of processing the former stage data block.

According to ~~the invention as set forth in claim 9,~~ another aspect of the present disclosure, there is provided a filtering apparatus for decoding a digital signal from the frequency domain to the time domain, comprising transformation means for multiplying an input data stream and a transformation matrix that is decomposed into a sparse matrix from an inverse MDCT transformation matrix for making the inverse MDCT of the input data stream composed of a plurality of data blocks and has a smaller size than the inverse MDCT transformation matrix, to acquire an output data stream composed of a plurality of data blocks, memory means for storing predetermined data contained in each data block of the

output data stream (e.g., an inverse MDCT buffer 12a as shown in FIGS. 4 and 6), and digital signal output means for outputting the digital signal in the time domain on the basis of each data block contained in the output data stream and the ~~data of data~~ data of a data block at the former stage stored in the memory means.

~~Additionally, the invention according to claim 2 is a filtering method as set forth in claim 1, wherein~~In another aspect, the first step further comprises a fourth step of making the DCT (Discrete Cosine Transform)-IV transformation process (e.g., transformation process in accordance with the expression (5)) for each data block of the input data stream, the second step further comprises a fifth step of storing a part of the processed result of each data block at the fourth step (e.g., a "former stage block data" as described in Detailed Description of the Invention) that is used in processing the data block at the latter stage, and the third step further comprises a sixth step of folding back and expanding a part of the processed result of each data block at the fourth step other than stored at the fifth step and multiplying the expanded data by a predetermined window to acquire a first processed result, and folding back and expanding a part of the data block at the former stage that is stored at the fifth step, and multiplying the expanded data by a predetermined window to acquire a second processed result, and a seventh step of adding the first and second processed results acquired at the sixth step.

~~Further, the invention according to claim 10 is a filtering apparatus as set forth in claim 9, wherein~~In yet another aspect, the transformation means makes the DCT (Discrete Cosine Transform)-IV transformation process for each data block of the input data stream, the memory means stores a part of the processed result of each data block through the DCT-IV transformation process that is used in processing the data block at the latter stage, and the digital signal output means further comprises: multiplication means for folding back and expanding a part of the processed result of each data block processed through the DCT-IV

transformation process other than stored in the memory means, and multiplying the expanded data by a predetermined window to output a first processed result, and folding back and expanding a part of the data block at the former stage that is stored in the memory means, and multiplying the expanded data by a predetermined window to output a second processed result, and addition means for adding the first and second processed results output by the multiplication means.

~~Further, the invention according to claim 3 is a filtering method as set forth in claim 1 or claim 2, wherein at~~In another aspect, in the third step, the processing method for generating the digital signal in the time domain is switched on the basis of the side information including the information regarding the decoding of the data block.

~~Furthermore, the invention according to claim 11 is a filtering apparatus as set forth in claim 9 or claim 10, wherein~~In another aspect, the digital signal output means switches the processing method for generating the digital signal in the time domain on the basis of the side information including the information regarding the decoding of the data block.

~~Further, the invention according to claim 4 is a filtering method as set forth in claim 2, wherein~~In another aspect, at the sixth step, the window by which each data block is multiplied is switched on the basis of the side information including the information regarding the decoding of the data block.

~~Further, the invention according to claim 12 is a filtering apparatus as set forth in claim 10, wherein~~In another aspect, the multiplication means switches the window by which each data block is multiplied on the basis of the side information including the information regarding decoding the data block.

~~Further, the invention according to claim 5 is a filtering method as set forth in any one of claims 1 to 4, wherein~~In another aspect, at the first step, the output data stream is acquired

by making the matrixing on each data block of the input data stream in accordance with the following ~~expression.~~expression:

$$y = C_N^{IV} x$$

where x is a column vector of one data block contained in the input data stream, y is a column vector of output data block corresponding to x, and C_N^{IV} is a DCT-IV transformation matrix represented by the following ~~expression,~~expression:

$$\left[C_N^{IV}\right]_{m,n} = \cos\left[\frac{\left(m + \frac{1}{2}\right)\left(n + \frac{1}{2}\right)\pi}{N}\right], \quad 0 \le m, n \le N - 1$$

where N is the number of data contained in x.

~~Further, the invention according to claim 13 is a filtering apparatus as set forth in any one of claims 9 to 12, wherein~~In another aspect, the transformation means acquires the output data stream by making the matrixing on each data block of the input data stream in accordance with the following ~~expression,~~expression:

$$y = C_N^{IV} x$$

where x is a column vector of one data block contained in the input data stream, y is a column vector of output data block corresponding to x, and C_N^{IV} is a DCT-IV transformation matrix represented by the following ~~expression,~~expression:

$$\left[C_N^{IV}\right]_{m,n} = \cos\left[\frac{\left(m + \frac{1}{2}\right)\left(n + \frac{1}{2}\right)\pi}{N}\right], \quad 0 \le m, n \le N - 1$$

where N is the number of data contained in x.

~~Further, the invention according to claim 6 is~~In another aspect, the present disclosure relates to a filtering method for use in decoding a digital signal from the frequency domain to the time domain, comprising a first step of multiplying an input data stream and a transformation matrix that is decomposed into a sparse matrix from a sub-band synthesis

transformation matrix for making the sub-band synthesis of the input data stream composed of a plurality of data blocks and has a smaller size than the sub-band synthesis transformation matrix, to acquire an output data stream composed of a plurality of data blocks (e.g., step S200 in FIG. 8), a second step of shifting each data block of the output data stream calculated and stored beforehand by one data block, every time each data block of the output data stream is calculated (e.g., step S100 in FIG. 8), a third step of storing the calculated data block (e.g., step S300 in FIG. 8), and a fourth step of generating the digital signal in the time domain on the basis of the stored data (e.g., step S400 to step S600 in FIG. 8).

~~The invention according to claim 14 is~~In another aspect, the present disclosure relates to a filtering apparatus for decoding a digital signal from the frequency domain to the time domain, comprising transformation means for multiplying an input data stream and a transformation matrix that is decomposed into a sparse matrix from a sub-band synthesis transformation matrix for making the sub-band synthesis of the input data stream composed of a plurality of data blocks and has a smaller size than the sub-band synthesis transformation matrix, to acquire an output data stream composed of a plurality of data blocks, memory means for storing the calculated data blocks (e.g., the sub-band synthesis buffer 13a in FIG. 8), memory control means for shifting each data block stored in the memory means by one data block, every time each data block of the output data stream is calculated and storing the calculated data block in the memory means, and digital signal output means for outputting the digital signal in the time domain on the basis of the data stored in the memory means.

~~The invention according to claim 7 is a filtering method as set forth in claim 6, wherein~~In another aspect, the first step further comprises a fifth step of making the DCT (Discrete Cosine Transform)-II transformation process for each data block of the input data stream, the fourth step further comprises a sixth step of folding back and expanding the predetermined data of the stored data block and multiplying the expanded data by a

predetermined window to acquire a data stream composed of a plurality of data blocks (e.g., step S400 and step S500 in FIG. 8), and a seventh step of adding the data contained in the data stream calculated at the sixth step at a predetermined period (e.g., step S600 in FIG. 8).

~~Further, the invention according to claim 15 is a filtering apparatus as set forth in claim 14, wherein~~In another aspect, the transformation means makes the DCT (Discrete Cosine Transform)-II transformation process for each data block of the input data stream, and the digital signal output means further comprises multiplication means for folding back and expanding a predetermined data of the data block stored in the memory means, and multiplying the expanded data by a predetermined window, to acquire a data stream composed of a plurality of data blocks, and addition means for adding the data contained in the data stream that are calculated by the multiplication means at a predetermined period.

~~Further, the invention according to claim 8 is a filtering method as set forth in claim 6 or claim 7, wherein at~~In another aspect, in the first step, the output data stream is acquired by making the matrixing on each data block of the input data stream in accordance with the following ~~expression,~~expression:

$$y = C_N^{II} x$$

where x is a column vector of one data block contained in the input data stream, y is a column vector of output data block corresponding to x, and C_N^{II} is a DCT-II transformation matrix represented by the following expression:

$$\left[C_N^{II}\right]_{m,n} = \cos\left[\frac{m(2n+1)\pi}{2N}\right], \quad 0 \le m, n \le N-1$$

where N is the number of data contained in x.

~~Furthermore, the invention according to claim 16 is a filtering apparatus as set forth in claim 14 or claim 15, wherein~~In another aspect, the transformation means acquires the output data stream making the matrixing on each data block of the input data stream in accordance with the following ~~expression,~~expression:

$$y = C_N^{II} x$$

where x is a column vector of one data block contained in the input data stream, y is a column vector of output data block corresponding to x, and C^{II}_N is a DCT-II transformation matrix represented by the following ~~expression,~~expression:

$$\left[C_N^{II}\right]_{m,n} = \cos\left[\frac{m(2n+1)\pi}{2N}\right], 0 \le m, n \le N-1$$

where N is the number of data contained in x.

~~According to the invention as set forth in claims 1 to 16,~~In each of these aspects, in decoding the digital signal from the frequency domain to the time domain, the number of arithmetical operations performed in the filtering and the memory capacity of data required for the operation can be reduced. Therefore, the decoding can be performed more rapidly, and the cost required for decoding reduced. Further, the power consumption required for the decoding process can be saved.

Also, ~~according to the invention as set forth in claims 3 and 7~~ in the decoding process, a suitable decoding method can be chosen in accordance with each input data stream.

Also, ~~according to the invention as set forth in claims 4 and 16, with this invention,~~ even when the coded data through various windows is mingled in the input data stream, ~~the decoding~~a decoding process can be appropriately performed.

Please replace the paragraph beginning on page 30, line 9, with the following rewritten paragraph:

Accordingly, the number of arithmetical operations made in the inverse MDCT transformation process is reduced by half as compared with the conventional method, ~~resulting in the~~ resulting in faster processing.

Please replace the paragraph beginning on page 30, line 21, with the following rewritten paragraph:

Moreover, the sub-band synthesis filter bank 13 performs the transformation process in accordance with the expression (6). Accordingly, the number of arithmetical operations made in the sub-band synthesis process is reduced by half as compared with the conventional method, resulting in the faster processing. Moreover, the memory capacity required in the sub-band synthesis process is reduced by half as compared with the conventional method because the intermediate operation results of sparse matrix decomposition are stored, resulting ~~in the lower costs.~~ in a lower cost. Also, when the sub-band synthesis process is performed, the power consumption ~~taken~~ required for storing the data can be ~~saved.~~reduced.

Please replace the paragraphs beginning on page 31, line 16 through page 32, line 1, with the following rewritten paragraphs:

~~According to the present invention as set forth in claims 1 to 16,~~In each of these aspects, in decoding the digital signal from the frequency domain to the time domain, the number of arithmetical operations performed in the filtering and the memory capacity of data required for the operation can be reduced. Therefore, the decoding can be performed more rapidly, ~~and the cost~~and a cost required for ~~decoding~~ decoding is reduced. Further, the power consumption required for the decoding process can be ~~saved.~~reduced.

Also, ~~according to the invention as set forth in claims 3 and 7,~~ in the decoding process, a suitable decoding method can be chosen in accordance with each input data stream.

Further, ~~Also according to the invention as set forth in claims 4 and 8,~~ even when the coded data through various windows is mingled in the input data stream, the decoding process can be appropriately performed.